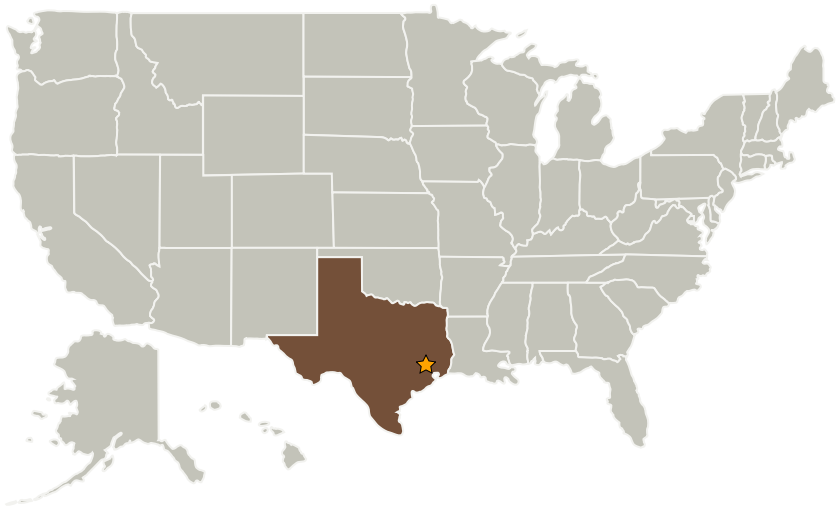
Coordinated Mobile Manipulation for Robotics Material Handling, Phase I

Completed Technology Project (2008 - 2009)

Project Introduction

Robots will be precursors to human exploration of the lunar surface. They will be expected to prepare the lunar surface for human habitation as well as conduct scientific investigations. As humans arrive, first for short-term stays, the robots should be able to shift to providing direct assistance to human exploration activities. Such tasks require a new generation of robotic vehicles -- a generation that has flexible, dexterous manipulation that can be scaled to include teams of machines. Since it will be impossible to tightly script complex operations ahead of time, it will be essential for planetary robots to be effective in unmodeled environments and unanticipated situations. Our proposal addresses four fundamental areas in mobile manipulation: 1) Motion Planning for Cooperative Mechanisms; 2) Task Sequencing & Monitoring; 3) Coordinated Control of Redundant Mechanisms; and 4) Human Robot Interface. Together, these innovations will create robots that can accomplish a wide variety of tasks to support NASA's exploration missions. We will demonstrate our approach using scenarios that involve several mobile robots with dexterous manipulators moving and assembling structures on the lunar surface and being supervised by remote operators.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Metrica, Inc.	Supporting Organization	Industry Minority-Owned Business, Women-Owned Small Business (WOSB)	San Antonio, Texas

Primary U.S. Work Locations
Texas

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX04 Robotic Systems
  - TX04.3 Manipulation
    - TX04.3.2 Grappling Technologies